

APPENDIX 2 -- EXHIBITS

L32 ANSWER 45 OF 72

CANCERLIT

ACCESSION NUMBER: 94690969 CANCERLIT

DOCUMENT NUMBER: 94690969

TITLE: The effect of copper and gallium compounds on ribonucleotide reductase.

AUTHOR: Narasimhan J

CORPORATE SOURCE: Medical Coll. of Wisconsin.

SOURCE: Diss Abstr Int [B], (1993) 53 (10) 5114.

ISSN: 0419-4217.

DOCUMENT TYPE: (THESIS)

LANGUAGE: English

FILE SEGMENT: Institute for Cell and Developmental Biology

ENTRY MONTH: 199409

ENTRY DATE: Entered STN: 19941107

Last Updated on STN: 19970509

ABSTRACT:

The mode of action of copper complexes (CuL and CuKTS) and gallium compounds (gallium nitrate and citrate) in cytotoxicity was studied.

The effects of these agents on the enzyme ribonucleotide

reductase was investigated by monitoring the tyrosyl free radical present in the active site of the enzyme through electron spin resonance spectroscopy. Ribonucleotide reductase is a key enzyme in cellular proliferation since it catalyzes the conversion of ribonucleotides to deoxyribonucleotides, the precursors in DNA synthesis. It consists of two subunits namely M1 and M2. M1, a dimer of molecular weight 170,000, contains the substrate and effector binding sites. M2, a dimer of molecular weight 88,000, contains non-heme iron and tyrosyl free radical essential for the activity of the enzyme. In the studies using copper complexes, the cellular oxidative chemistry was examined by ESR studies on adduct formation with membranes, and oxidation of thiols. Membrane thiols were shown to be oxidized through the reduction of the ESR signal of the thiol adduct and the analysis of

sulphydryl content. Using the radiolabel 59Fe, the inhibitory action of copper thiosemicarbazones on cellular iron uptake was shown. The inhibitory action of CuL on ribonucleotide reductase was shown by the quenching

of the tyrosyl free radical in the M2 subunit. The hypothesis that

gallium directly interacts with the M2 subunit of the enzyme and displaces the iron from it was proven to be true. The tyrosyl free radical signal from cell lysates was shown to be inhibited by the direct addition of ***gallium*** compounds. Furthermore, the signal was regenerated upon addition of soluble iron to the cell lysates. Gallium content in the cells was measured by a fluorimetric method, to ensure the presence of sufficient amounts of gallium to compete with the iron in the M2 subunit. The enzyme activity, measured by the conversion of [14C]-CDP to the labeled deoxy CDP, was shown to be inhibited by the addition of gallium nitrate in a cell free assay system. The immunoprecipitation studies of the 59Fe-labeled M2 protein using the monoclonal antibody directed against this subunit suggested that gallium releases iron from the M2 subunit.

(Full text available from University Microfilms International, Ann Arbor, MI, as Order No. AAD93-02808)

CAS REGISTRY NO.: 7440-50-8 (Copper); 9007-49-2 (DNA); 7440-55-3

(Gallium)

CHEMICAL NAME: O (Free Radicals); EC 1.17.4 (Ribonucleotide)

BEST AVAILABLE COPY

Reductases); 0 (Sulphydryl Compounds)

=>

BEST AVAILABLE COPY